CLAIMS

[Claim(s)]
[Claim 1]In a Walking Magazine Haas style heating furnace which arranges a movable-furnace floor and a **** hearth for laying a heating material and conveying inside of a furnace, A Walking Magazine Haas style heating furnace forming a slant face for circular section material rolling and falling by material self-weight, and rotating only a predetermined angle in a part of mounting surface of either said movable-furnace floor or a stationary furnace floor at least.
[Claim 2]The heating furnace according to claim 1 establishing space in the lower part of a slant face by forming a slant face which rolls circular section material with a skid with narrow enough width to heated length of member, and preventing scale deposition on a slant face.
[Claim 3]Install a slant face which rolls circular section material in either one of a movable-furnace floor or a stationary furnace floor, and. The heating furnace according to claim 1 or 2 having located said slant surface part caudad at the time of conveyance standby so that a range in which material after rotation is located might not be contacted, and making portions other than a slant surface part into physical relationship which supports material in the same height as a hearth of a direction in which a slant face is not installed.
[Claim 4]It faces conveying circular section material using a heating furnace of claim 1-3 given in any 1 paragraph, It is made to appear in a near slant face from which circular section material rolled and falls slant-face length and one relation of horizontal carrying distance across a slant-face summit when horizontal carrying distance is the shortest, And a transportation method of circular section material in a Walking Magazine Haas style heating furnace characterized by making it rotate only a predetermined angle after appearing in a near slant face from which circular section material rolls and falls, when horizontal carrying distance is the longest.
[Claim 5]A transportation method of the circular section material according to claim 4 characterized by facing that circular section material appears in a slant face of a hearth, and rotates, performing rotation gradually over multiple times, and making it total of these angle of rotation be not less than 180 degrees.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to the transportation method of the inner substance in a Walking Magazine Haas style heating furnace for steel materials and the heating furnaces, such as carbon steel and stainless steel, and a circular section material in the air.
[0002]
[Description of the Prior Art]A Walking Magazine Haas style is in one form of a continuous system heating furnace, and bloom, a billet, etc. are comparatively used well as a heating method of the steel materials (material is called henceforth) of a small cross. As a feature of the heating furnace of this form, the point which material is not worn with a hearth like a pusher furnace, and a sliding crack does not produce, and the point that structure is simple and ends from a walking beam furnace since there is no heating machine style in a furnace lower part are mentioned for conveyance by a movable-furnace floor.
[0003]The point that on the other hand the sliding direction temperature gradient (up-and-down deflected heat is called henceforth) of a section vertical to a material longitudinal direction becomes large easily as demerit is mentioned. This is because there is no heating method from the undersurface, and in order to reduce up-and-down deflected heat, it is common at the time of conveyance that an interval is vacated between adjacent materials and radiation heating from combustion gas is made to be performed effectively.
[0004]By always making the ascending position of a movable-furnace floor into a position in readiness, providing space between a stationary furnace floor and material, and changing the method (JP,57-123915,A) which increased radiation to a material lower part, and the conveyance start position at the time of furnace insertion one by one, Whenever it conveys, it puts on the hearth face which a front material did not appear but was heated by the radiant heat in a furnace, and the method (JP,5-126472,A) of reducing up-and-down deflected heat by heat conduction from there, etc. are performed. When material has a circular section, there is also the method of heating, while rotating material like JP,53-37115,A or JP,60-211010,A.
[0005]
[Problem(s) to be Solved by the Invention]Unit time and the heating capability per unit hearth face product, and what is called a heating rate in the hearth fall, so that a material interval is vacated for up-and-down deflected heat reduction. For this reason, the conveyer style of a heating zone and a soaking zone is made to become independent, a material interval is narrowed, a heating rate in the hearth is raised in a heating zone, when [of a soaking zone] changing, a material interval is extended, and the example which has minimized the ability degradation as the whole is also in a walking beam type furnace.
[0006]However, since it is difficult to make the hearth of a dividing part become intricate mutually like a walking-beam type in the case of a Walking Magazine Haas style heating furnace, almost all the movable-furnaces floor is united in the direction of a length of chamber, and a material interval cannot be changed from insertion to extraction. Therefore, priority must be given to heating capability or either of the up-and-down deflected heat reduction by a production type.
[0007]A technical problem occurs also about the up-and-down deflected heat reducing method devised

so far. That is, in the method of always making the ascending position of the movable-furnace floor shown by JP,57-123915,A a position in readiness, although the range in which material has floated from the hearth is convenient, to the portion which is in contact with the hearth on the contrary, it may not be effective and a temperature gradient may be produced in a material longitudinal direction. In the method of keeping material from lapping with the hearth in which the conveyance start position at the time of the furnace insertion shown by JP,5-126472,A was changed into, and precedence material appeared, from the case of transportation quantity regularity, a material interval is further vacant and heating ability degradation is caused.

[0008]Although the method of putting circular section material on a slant face, and rotating with prudence like JP,60-211010,A is mainly performed by the walking beam furnace, when the Walking Magazine Haas furnace performs, the following technical problems occur. Namely, since a heat-resisting-steel skid is installed in a length-of-chamber overall length irrespective of material sectional shape in a walking beam furnace, rotation conveyance is attained by making this skid shape into the waveform which has a slant face beforehand, without adding most installation costs, but. At the Walking Magazine Haas furnace, generally a hearth is a firebrick, and in order to install a skid, the addition of an installation cost is needed.

[0009]An interval is vacant only as for the part which rotates material on a slant face compared with the case where a hearth is flat, and heating capability declines. Since there is no big space in the lower part like a walking beam furnace, it is easy to deposit a scale on a slant face, therefore rolling resistance increases, and material rotation is easy to be checked. When a skid is used as heat resisting steel as a problem of deflected heat, in order to support the lower part in an internal water cooling type pipe, the point which the temperature of the material which touches a skid falls and produces a skid mark is mentioned.

[0010]

[Means for Solving the Problem]The gist of this invention for attaining the above-mentioned purpose is as follows.

(1) In a Walking Magazine Haas style heating furnace which arranges a movable-furnace floor and a **** hearth for laying a heating material and conveying inside of a furnace, A Walking Magazine Haas style heating furnace forming a slant face for circular section material rolling and falling by material self-weight, and rotating only a predetermined angle in a part of mounting surface of either said movable-furnace floor or a stationary furnace floor at least.

(2) A heating furnace of the above-mentioned (1) statement establishing space in the lower part of a slant face by forming a slant face which rolls circular section material with a skid with narrow enough width to heated length of member, and preventing scale deposition on a slant face.

(3) Install a slant face which rolls circular section material in either one of a movable-furnace floor or a stationary furnace floor, and. A heating furnace the above (1) having located said slant surface part caudad at the time of conveyance standby so that a range in which material after rotation is located might not be contacted, and making portions other than a slant surface part into physical relationship which supports material in the same height as a hearth of a direction in which a slant face is not installed, or given in (2).

(4) The above (1) It faces conveying circular section material using a heating furnace of - (3) given in any 1 paragraph, It is made to appear in a near slant face from which circular section material rolled and falls slant-face length and one relation of horizontal carrying distance across a slant-face summit when

horizontal carrying distance is the shortest, And a transportation method of circular section material in a Walking Magazine Haas style heating furnace characterized by making it rotate only a predetermined angle after appearing in a near slant face from which circular section material rolls and falls, when horizontal carrying distance is the longest.
(5) A transportation method of circular section material of the above-mentioned (4) statement characterized by facing that circular section material appears in a slant face of a hearth, and rotates, performing rotation gradually over multiple times, and making it total of these angle of rotation be not less than 180 degrees.
[0011]Although the installation range of a slant face which rolls circular section material was limited here and it was made a part of material mounting surface, it is more preferred for purpose achievement of this invention to use 2/3 or less [of a length of chamber]. Even if hearth portions other than slant surface part installation provide small unevenness and a bumping post-like projection so that circular section material may not roll in a hearth, their circular section material is conversely good also as a thing of display flatness which rolls easily. Although width of a skid which forms a slant face which rolls circular section material requires that width should narrow enough to heated length of member, it is desirable for a skid width of about one place to be 150 mm or less.
[0012]
[Embodiment of the Invention]Form this invention in the range which limited the slant face of the movable-furnace floor of the Walking Magazine Haas furnace, or the stationary furnace floor for which circular section material is rolled by prudence to either or both at least, and it makes the remaining hearths almost flat, Though 1 time of horizontal transportation quantity is made into the short feed per revolution on the basis of the material interval in a hearth flat part and heating capability is thought as important, it is a means to reduce up-and-down deflected heat by rotating material certainly in a slant surface part.
[0013]First, a slant face makes one pair what is on the same straight line at a furnace width direction, and makes it the required sufficient shape and number from which the rotation of the material restored to the acceptable value of up-and-down deflected heat is obtained. The grade by which radiation heating of the material is carried out from the circumference becomes so small that the upper surface becomes the lower part via the side most greatly. Therefore, a temperature gradient with the side is hard to be canceled only by turning the upper and lower sides over simply. It is made for total of angle of rotation to be not less than 180 degrees, as material becomes inside-out, angle of rotation per time heating the side at 15 to about 120 degrees desirably from this in two or more steps. As for a slant face, in the case of the 2 belt type heating furnace which consists of a heating zone and a soaking zone, for example, although this slant-face installation range is arbitrary, heating capability is thought as important in a heating zone, a hearth presupposes that it is flat, and providing in the latter part of a soaking zone is desirable. A slant surface part may be divided into two or more parts in a furnace, and may be provided, respectively.
[0014]Next, the transportation method of material is made into conditions which rotate only the angle needed after it appears in the slant face of the side which rolls and falls, even when it is made to appear in the slant face of the side which rolled and falls across a slant-face summit when the shortest, and the horizontal carrying distance of a movable-furnace floor is the longest.
[0015]In order to avoid that slant-face HESUKERU accumulates and rolling resistance increases, make a slant face into a skid with narrow enough width compared with a furnace width, and let slant faces

other than a skid be space. It becomes possible to prevent the increase in the rolling resistance of a skid and to maintain rotation of a stable material for a long time by making it easy to fall to the space of skid both the sides, and not making the scale on a skid deposit by this.

[0016]In order that a skid may consider it as steel from a durable field desirably, however may control a skid mark, a skid is installed in either one of a movable-furnace floor or a stationary furnace floor, and is taken as the physical relationship which cannot touch material a skid and directly at the time of conveyance standby. At this time, a hearth flat part is made into the same height as the hearth of the direction in which a skid is not installed, and supports material to both a movable-furnace floor and the stationary furnace floor. However, when material has concern of hanging down because a skid does not support material, Make the perpendicular direction interval of a skid and material below into a fixed value, when a fixed quantity of materials hang down, in contact with a skid, advance hanging down beyond it, make and are sufficient, and a sliding direction is made to go up and down a movable-furnace floor, and material is supported for every fixed time.

[0017]

[Example]Next, this invention is explained based on a drawing. Although the example which installed the slant face in the movable-furnace floor is shown, each drawing is the same as that of an outline, even when it installs in a stationary furnace floor. The example of this invention claim 1 is shown in drawing 1. A Walking Magazine Haas style heating furnace of illustration is a top 2 belt type which consists of the heating zone 3 and the soaking zone 4.

The circular section material 5 is lifted with the lifting device 6 of the movable-furnace floor 1 installed in the furnace lower part, and is intermittently conveyed one by one from the left of a figure by being ahead sent with the horizontal conveying machine 7 on the right.

[0018]In such a heating furnace, while arranging two or more steps of slant faces 2 for making the latter part of the soaking zone 4 of the movable-furnace floor 1 rotate the material 5, the other hearth is made into outline flatness. However, when material rolls easily at the case where the carrying pitch of material is limited, or the time of conveyance, the hearth of a flat part may be made into a small waveform, or a bumping post-like skid etc. may be provided in some places.

[0019]The example of the transportation method concerning this invention is shown in drawing 2. although shape is changed somewhat the 1st step of thing, and henceforth [the 2nd step], if certain conditions are fulfilled [the slant face 2 shown in drawing 2], even when it is altogether the same, or even if one differs at a time in it, it is not cared about. In drawing 2, while the movable-furnace floor has been a lower limit, when retreating, slant-face height H_1 is made lower than the height to an adjoining stationary furnace floor from the hearth in case a movable-furnace floor is located in a lower limit so that it may not interfere with material. Horizontal distance B_2 of the near slant face which the material of a skid straddles crosses a slant-face summit also with the shortest transportation quantity. On the other hand, horizontal distance B_1 of the material rotation side slant face of a skid is taken as the conditions which serve as angle of rotation of an aim on a slant face and from which it rolls and the distance L is acquired combining 1 time of the horizontal carrying distance P. Make the groove bottom of the slant face 2 into the circle of the radius R, after material rolls and falls a slant face, it is made to stop gently, and it avoids colliding strongly to the next slant face.

[0020]In consideration of the above point, angle $theta_2$ of the near slant face which the material of angle $theta_1$ of the material rotation side slant face of a skid and a skid straddles is decided suitably. The state to which a:material arrived at the 1st skid this side in drawing 2, the state which is in a skid groove bottom after b:material's rotating, the state which draft conveyance is carried out and has c:material above a slant face, d: The state where draft conveyance was carried out, material rolled and fell the slant face, and the skid groove bottom was arrived at is shown, respectively.
[0021]In the above-mentioned composition, by conveying material with the transportation quantity P shorter than the slant-face pitch W, material appears on a slant face, and rolls and falls to a groove bottom. If its rotation is smooth after a material stop position appears in the 1st slant face, it is in agreement focusing on the circle of a groove bottom. Therefore, angle of rotation and sum total angle of rotation per time can be made the optimal according to material conditions by choosing the conditions of slant-face shape, the slant-face number, and a carrying pitch. In order that the inside of a material section may also be uniformly heated one by one from the direction of plurality, and up-and-down deflected heat may reduce it and it may extend a material interval by rotating material and heating an outside surface over multiple times, it becomes unnecessary thus, to take large transportation quantity especially.
[0022]Next, the example of claim 2 is described using drawing 2, drawing 3, and drawing 4. The slant face 2 is made into a skid, and as shown in drawing 4, it fully narrows width compared with the length of the material 5. By doing in this way, most slant-face lower parts can be made into space, it controls that the scale which falls from the material 5 accumulates on a slant face, and rolling resistance increases, and smooth rotation of the material 5 can be maintained over a long period of time. As shown in drawing 2, the influence of scale deposition can be suppressed also in the material stop part after rotation, and a stop position can be stabilized for a long period of time because only H_2 makes the groove bottom height of a skid higher than a hearth.
[0023]Next, the example of claim 3 is described using drawing 3, drawing 4, and drawing 5. When making a skid into steel, as shown in drawing 3, the reason it is common installing the skid 2 on the cooling piping 9 which serves as the supporting structure below the surface of the hearth 1, and cooling a skid is for the endurance of a skid, but. So, temperature will fall by heat conduction and a skid will produce a skid mark, if temperature becomes low compared with the hearth flat part constituted from a firebrick etc. and material touches a skid. In order to prevent this, as shown in drawing 4, the material 5 is supported by the adjoining stationary furnace floor 8 side at the time of conveyance standby, and the movable-furnace floor 1 is made into the physical relationship that it lowers caudad and the skid 2 does not touch material. However, since material is bent by an elevated temperature by creep, as shown in drawing 5 (a), a hearth flat part is made into the same hearth height as the adjoining stationary furnace floor side, and prevents a creep deflection in support of a material overall length. Since material rotates a skid portion, the deflection by creep is seen from material for every rotation, and directions differ, will be distributed and will not accumulate it.
[0024]Each state of material conveyance is shown in (a) of drawing 5, (b), (c), and (d). (a) is a conveyance waiting state. Skid 2 portion of the movable-furnace floor 1 lowers caudad the groove bottom portion located after the material's 5 rotating, space is provided between a skid and material, and both are kept from contacting soon at this time. You may come out of some summits of the skid 2 above

the height of the stationary furnace floor 8. Next, (b) shows the state where it retreated, once the movable-furnace floor 1 descends. It is made for the summit of the 1st slant-face skid to be located between the material by the side of the maximum extraction of a hearth flat part, and the material following it. (c) is in the state in which the movable-furnace floor went up, and on a slant face, it appears, and material rolls, and falls and rotates at this time, and it stops in a groove bottom. (d) is in the state in which the movable-furnace floor moved forward, and the material which appeared in the groove bottom follows it ahead only the transportation quantity of a draft further. Henceforth, the movable-furnace floor 1 repeats the operation which descended, returned to the state of (a) and was described above.

[0025]

[Effect of the Invention]Limit the range and the slant face which fails to roll circular section material in a Walking Magazine Haas style heating furnace is installed, It is made to appear in the near slant face from which circular section material rolled and falls the relation between slant-face length and horizontal carrying distance across a slant-face summit even when horizontal carrying distance is the shortest, And in the method of this invention of having made it rotate only a predetermined angle after appearing in the near slant face from which circular section material rolls and falls, even when horizontal carrying distance is the longest. Since it is not necessary to expand a material interval especially for up-and-down deflected heat reduction, the fall of heating capability can be eliminated compared with the case where all the material interval is expanded in a furnace. According to the device of this invention, compared with the case where the slant face which makes a length-of-chamber overall length rotate material is installed, the flexibility of horizontal transportation quantity is large and an installation cost can also be reduced substantially. When using steel skids, the water cooled tube length which supports a skid can be shortened, and a cooling water loss can be made into the minimum.

[0026]By making into a skid with narrow enough width the slant face which rolls circular section material to heated length of member, it rolls and scale deposition on a slant face is suppressed, it can continue at a long period of time, and the function to rotate circular section material can be demonstrated. By making relative caudad the hearth by the side of skid installation to another hearth, and preventing from touching a skid at a heating material, the skid mark of material can be reduced and temperature can be made uniform at a longitudinal direction.

[Translation done.]

EXAMPLE

[Example]Next, this invention is explained based on a drawing. Although the example which installed the slant face in the movable-furnace floor is shown, each drawing is the same as that of an outline, even when it installs in a stationary furnace floor. The example of this invention claim 1 is shown in drawing 1. A Walking Magazine Haas style heating furnace of illustration is a top 2 belt type which consists of the heating zone 3 and the soaking zone 4.
The circular section material 5 is lifted with the lifting device 6 of the movable-furnace floor 1 installed in the furnace lower part, and is intermittently conveyed one by one from the left of a figure by being ahead sent with the horizontal conveying machine 7 on the right.

[0018]In such a heating furnace, while arranging two or more steps of slant faces 2 for making the latter part of the soaking zone 4 of the movable-furnace floor 1 rotate the material 5, the other hearth is made into outline flatness. However, when material rolls easily at the case where the carrying pitch of material is limited, or the time of conveyance, the hearth of a flat part may be made into a small waveform, or a bumping post-like skid etc. may be provided in some places.
[0019]The example of the transportation method concerning this invention is shown in drawing 2. although shape is changed somewhat the 1st step of thing, and henceforth [the 2nd step], if certain conditions are fulfilled [the slant face 2 shown in drawing 2], even when it is altogether the same, or even if one differs at a time in it, it is not cared about. In drawing 2, while the movable-furnace floor has been a lower limit, when retreating, slant-face height H_1 is made lower than the height to an adjoining stationary furnace floor from the hearth in case a movable-furnace floor is located in a lower limit so that it may not interfere with material. Horizontal distance B_2 of the near slant face which the material of a skid straddles crosses a slant-face summit also with the shortest transportation quantity. On the other hand, horizontal distance B_1 of the material rotation side slant face of a skid is taken as the conditions which serve as angle of rotation of an aim on a slant face and from which it rolls and the distance L is acquired combining 1 time of the horizontal carrying distance P. Make the groove bottom of the slant face 2 into the circle of the radius R, after material rolls and falls a slant face, it is made to stop gently, and it avoids colliding strongly to the next slant face.
[0020]In consideration of the above point, angle $theta_2$ of the near slant face which the material of angle $theta_1$ of the material rotation side slant face of a skid and a skid straddles is decided suitably. The state to which a:material arrived at the 1st skid this side in drawing 2, the state which is in a skid groove bottom after b:material's rotating, the state which draft conveyance is carried out and has c:material above a slant face, d: The state where draft conveyance was carried out, material rolled and fell the slant face, and the skid groove bottom was arrived at is shown, respectively.
[0021]In the above-mentioned composition, by conveying material with the transportation quantity P shorter than the slant-face pitch W, material appears on a slant face, and rolls and falls to a groove bottom. If its rotation is smooth after a material stop position appears in the 1st slant face, it is in agreement focusing on the circle of a groove bottom. Therefore, angle of rotation and sum total angle of rotation per time can be made the optimal according to material conditions by choosing the conditions of

slant-face shape, the slant-face number, and a carrying pitch. In order that the inside of a material section may also be uniformly heated one by one from the direction of plurality, and up-and-down deflected heat may reduce it and it may extend a material interval by rotating material and heating an outside surface over multiple times, it becomes unnecessary thus, to take large transportation quantity especially.

[0022]Next, the example of claim 2 is described using drawing 2, drawing 3, and drawing 4. The slant face 2 is made into a skid, and as shown in drawing 4, it fully narrows width compared with the length of the material 5. By doing in this way, most slant-face lower parts can be made into space, it controls that the scale which falls from the material 5 accumulates on a slant face, and rolling resistance increases, and smooth rotation of the material 5 can be maintained over a long period of time. As shown in drawing 2, the influence of scale deposition can be suppressed also in the material stop part after rotation, and a stop position can be stabilized for a long period of time because only H_2 makes the groove bottom height of a skid higher than a hearth.

[0023]Next, the example of claim 3 is described using drawing 3, drawing 4, and drawing 5. When making a skid into steel, as shown in drawing 3, the reason it is common installing the skid 2 on the cooling piping 9 which serves as the supporting structure below the surface of the hearth 1, and cooling a skid is for the endurance of a skid, but. So, temperature will fall by heat conduction and a skid will produce a skid mark, if temperature becomes low compared with the hearth flat part constituted from a firebrick etc. and material touches a skid. In order to prevent this, as shown in drawing 4, the material 5 is supported by the adjoining stationary furnace floor 8 side at the time of conveyance standby, and the movable-furnace floor 1 is made into the physical relationship that it lowers caudad and the skid 2 does not touch material. However, since material is bent by an elevated temperature by creep, as shown in drawing 5 (a), a hearth flat part is made into the same hearth height as the adjoining stationary furnace floor side, and prevents a creep deflection in support of a material overall length. Since material rotates a skid portion, the deflection by creep is seen from material for every rotation, and directions differ, will be distributed and will not accumulate it.

[0024]Each state of material conveyance is shown in (a) of drawing 5, (b), (c), and (d). (a) is a conveyance waiting state. Skid 2 portion of the movable-furnace floor 1 lowers caudad the groove bottom portion located after the material's 5 rotating, space is provided between a skid and material, and both are kept from contacting soon at this time. You may come out of some summits of the skid 2 above the height of the stationary furnace floor 8. Next, (b) shows the state where it retreated, once the movable-furnace floor 1 descends. It is made for the summit of the 1st slant-face skid to be located between the material by the side of the maximum extraction of a hearth flat part, and the material following it. (c) is in the state in which the movable-furnace floor went up, and on a slant face, it appears, and material rolls, and falls and rotates at this time, and it stops in a groove bottom. (d) is in the state in which the movable-furnace floor moved forward, and the material which appeared in the groove bottom follows it ahead only the transportation quantity of a draft further. Henceforth, the movable-furnace floor 1 repeats the operation which descended, returned to the state of (a) and was described above.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]The schematic diagram showing this invention example of the Walking Magazine Haas furnace which established the slant face which rolls circular section material in the soaking zone.
[Drawing 2]The figure showing the relation of the slant-face shape and horizontal carrying distance which roll the circular section material in this invention.
[Drawing 3]The explanatory view of the example of support of the steel skids adopted by this invention.
[Drawing 4]The explanatory view at the time of installing a skid in a movable-furnace floor in the example prevented from touching a skid and a heating material waiting.
[Drawing 5]It is an explanatory view of this invention transportation method prevented from touching a skid and a heating material waiting, and when (a) has a movable-furnace floor in a position in readiness and (b) has a movable-furnace floor in a retreated location, (c) shows the case where (d) has a movable-furnace floor in an advance position, respectively, when a movable-furnace floor is located in an ascending position.
[Description of Notations]
1: Movable-furnace floor 2 : a slant face or a skid
3: Heating-zone 4 : soaking zone
5: Heating material 6 : a lifting device of a movable-furnace floor
7: Horizontal conveying machine 8 of a movable-furnace floor : stationary furnace floor
9: Water-cooled piping 10 for skid support : the hearth frame of a movable-furnace floor
11: Hearth frame 12 of a stationary furnace floor : water-cooled piping holding frame
H_1: Height from a hearth to a skid summit

H_2: Height from a hearth to a skid groove bottom

B_1: Horizontal distance of the material rotation side slant face of a skid

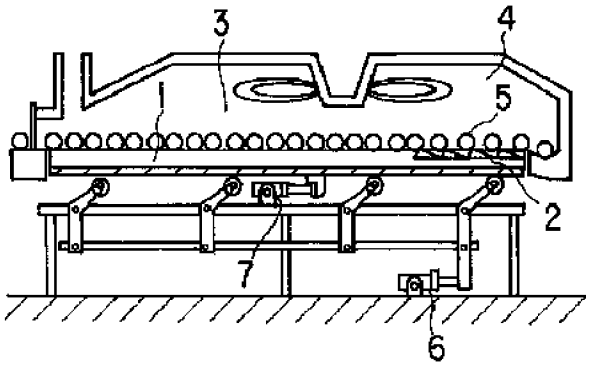
B_2: Horizontal distance of the near slant face which the material of a skid straddles

W: The pitch of a skid
Distance for material conveyance water square per P:time
The material in L:1 slant face rolls, and it is distance.
R: The circle radius of a skid groove bottom

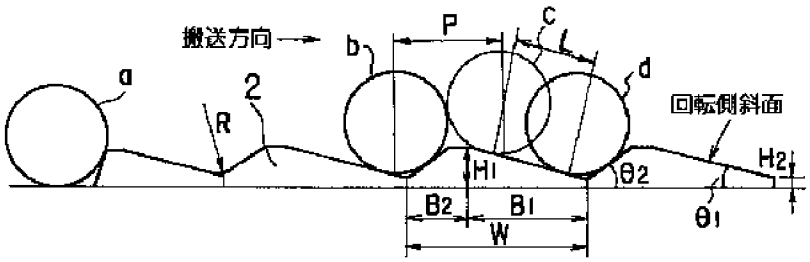
[Translation done.]

DRAWINGS

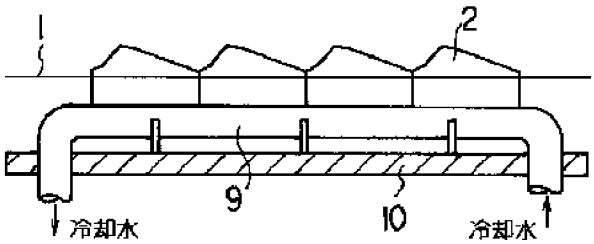
[Drawing 1]



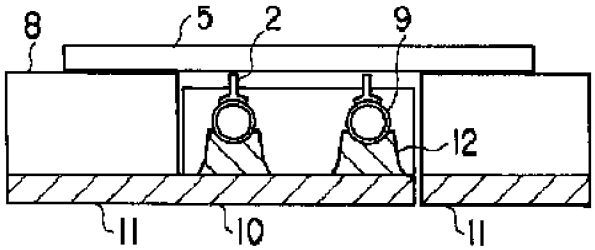
[Drawing 2]



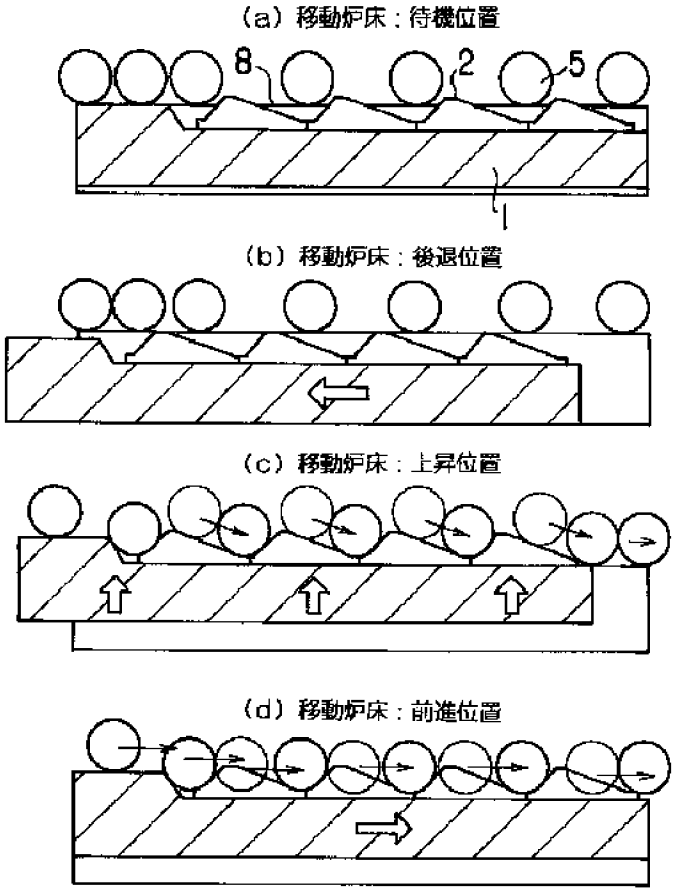
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Translation done.]